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THE INDUSTRIAL ARCHAEOLOGY OF BRISTOL

R. A. BUCHANAN

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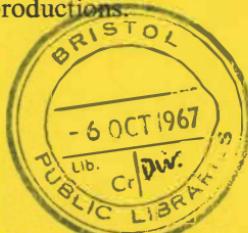
The Industrial Archaeology of Bristol is the eighteenth in a series of pamphlets issued by the Bristol Branch of the Historical Association through its Standing Committee on Local History. Its author, Dr. R. A. Buchanan, is Senior Lecturer in Social History in Bath University of Technology and he has for some years been engaged in conjunction with Mr. Neil Cossons, on a full-length survey of the industrial archaeology of the Bristol Region which will be published at a later date.

The next two pamphlets in this series will be *Captain Thomas James and the North West Passage* by Professor C. M. MacInnes and *The Anti-Slavery Movement in Bristol* by Professor Peter Marshall.

Other titles under consideration include: Bristol Castle; the Blue Maids' Orphanage; the street names of Bristol; Bristol railways; Sebastian Cabot; the medieval churches of Bristol landscape gardening in Bristol. There will also be further pamphlets in the special series on the Port of Bristol.

The price of the pamphlets has been kept as low as possible so that they may be available to a wide circle of readers. Unfortunately rising costs of printing and of postage make it unlikely that the present price of 3/- can be maintained much longer unless the pamphlets are subsidised in some way.

The pamphlets can be obtained from most Bristol booksellers or direct from Mr. Peter Harris, 74 Bell Barn Road, Stoke Bishop, Bristol 9. Details of earlier publications are given at the back of this pamphlet. It will be of great help if readers will place standing orders for future productions.



The term "industrial archaeology" is a new one, being little more than ten years old, and it represents a relatively new concern in the historical consciousness of academics and the general public. This is the concern with industrial remains. We have long been conscious of the need to preserve representative architectural monuments, even if we have not always been outstandingly successful in doing so. But the widespread awareness of industrial monuments is new, and has been aroused by the growing interest in the history of technology on the one hand and, on the other, by the rapid progress in the last decade of the processes of urban renewal. The latter, in particular, has involved the demolition of the relics of old industries, houses, factories, mineral workings, and other features. It has raised as a matter of extreme urgency the need to record and evaluate these relics before they are destroyed and, in some cases, to urge the preservation of significant monuments. These are the functions of industrial archaeology.

Like most other modern cities, Bristol is experiencing the forces of urban renewal, with extensive programmes of slum clearance, road construction, and the development of open country around its periphery. Bristol, however, has a longer tradition of continuous industrial evolution than most British cities, and the continuity and variety of this tradition over a thousand years has created an urban landscape of extraordinarily rich texture. It follows from this that Bristol has more to lose than most other cities from indiscriminate renewal and the building-up of its surrounding areas. Bristol has thus a particular duty to preserve for posterity the best of its inheritance, including a representative selection of the industrial remains from its past phases of development. This industrial heritage is already seriously depleted, and much of what remains is scattered and fragmentary. It can best be surveyed by reviewing the major industries of the city beginning, as is most appropriate, with the port.¹

The Port of Bristol

From the point of view of the industrial archaeologist, the main interest of the port of Bristol lies in the City Docks of the Floating Harbour and the various works associated with them.² The Avonmouth Docks are too busy to rank as industrial monuments, and the river between the Severn and the Cumberland Basin is of little interest, with two important exceptions. The first of these is Sea Mills Harbour. Situated at the point where Trym Brook enters the River Avon, this small inlet or creek was almost certainly used as a harbour during the Roman occupation of Britain, and there are Roman remains in the vicinity to testify to this use. The basin was enlarged and equipped as one of the earliest wet docks in the country in the eighteenth century, but it was too far from the city to be popular with Bristol merchants and so it was virtually abandoned by the second half of the century. Substantial sections of the dock walls remain, however, and make it a significant industrial monument. The other item of interest on this section of the Avon is the Powder House, about a mile downstream from Sea Mills Harbour, and on the same side of the river. This was the place at which gunpowder and other inflammable materials were deposited before ships were allowed to proceed to the city wharves, where the conditions were so crowded that the danger of a fire amongst the wood, tar, and sailcloth, was a very real hazard. The Powder House still stands, a squat stone building on the side of a low cliff. It is now part of a smallholding, and it is only visible clearly from the river.

The complex of wharves, basins, and docks which now comprise the Floating Harbour were, until the beginning of the nineteenth century, part of the main water-courses of the Avon and the Frome. Between 1804 and 1809, however, they were enclosed to provide a "float" — a harbour at a permanent high-water level — as part of an extensive civil engineering work designed by William Jessop and carried out under the supervision of Jessop and his son Josias. The Floating Harbour and its associated works survives today, with only slight modifications, as a monument to the skill of the Jessops. The plan involved the construction of a weir across the Avon at Netham, the excavation of a "New Cut" two miles in length to take the tidal flow of the Avon, from Rownham up to what is now Temple Meads station, the building of a dam at Temple Meads to divert the Avon into the New Cut, and another dam at Rownham to maintain the water level in the Floating Harbour, the digging of a "Feeder Canal" a mile in length from Netham to Temple Meads to give the Float a supply of fresh water

and thus make it independent of the tidal water of the lower Avon, and the construction of the Cumberland Basin, the Bathurst Basin, and numerous locks. With the exception of one or two lock gates, all these features are still part of the industrial landscape of Bristol.

One of the most remarkable parts of this great engineering operation was hewing the course of the New Cut, a substantial part of which passed through hard sandstone, making it one of the outstanding artificial water-courses of its period. The stone which was cut out in the process was used extensively to line the walls of the new Floating Harbour. The Feeder Canal was cut through softer material, and it is very likely that the clay dug out here was made into bricks on the spot for use elsewhere in the construction. The new bridges built by Jessop to cross the Cut at Temple Meads and Bedminster have now both been replaced, and several other modifications have been made in the work as he left it. By the 1830s it was found that the Float was silting up alarmingly, and the great engineer I. K. Brunel was consulted on the problem. Brunel made several suggestions for clearing the Float of silt, and some of these, including a modification of the outfall into the Avon at Rownham and the construction of a special dredger or "scraper" to Brunel's specification, were adopted. The *B.D.6*, as the scraper was known, survived in operational order until the 1960s. It was then scrapped, but its dismembered parts await re-assembly in the new Department of Technology of the City Museum.

Brunel left his mark on the City Docks in other ways. He was responsible for improvements in the entrances to the Cumberland Basin, and two of the swing bridges which he built over these entrances survive, although they are now dwarfed by the new fly-over. The ship-yard of William Patterson, where Brunel's steamship the *Great Western* was built, has disappeared, although a plaque has been set on the wall of Prince's Wharf nearest to Wapping Road to commemorate the place. The special dry-dock which Brunel constructed in order to build his second steamship the *Great Britain*,³ however, survives as part of the one remaining Bristol ship-yard, Charles Hill's. Hill's have been associated with their present site since early in the nineteenth century.⁴

Of the many items of industrial archaeological interest in the Floating Harbour, only the most important can be mentioned. First, the Merchant's Dock, close to the Cumberland Basin on the North side of the Harbour. This was constructed in the second half of the eighteenth century by the Bristol Quaker industrialist and merchant William Champion to provide an enclosed dock before

the construction of the Floating Harbour. It was not a great commercial success for much the same reason as the Sea Mills project earlier in the century — it was felt to be too far from the main centre of business in the city. Secondly, the area on the opposite side of the Harbour around the Underfall Yard, contains much of interest. The Underfall itself was one of Brunel's modifications, the idea being that mud dredged from the floor of the Float should be deposited here and swept out into the Avon as the tide began to ebb. This is still the method used to keep the Harbour clear. Nearby is the engine house accommodating the engines, now electric, which power the hydraulic equipment throughout the Floating Harbour. The cottages on Nova Scotia Place and Avon Crescent were built to house port employees, although most of those remaining are now converted to other uses. In the Underfall Yard, also, is the main engineering workshop of the PBA, and this contains some gems of industrial archaeology. The plant includes some magnificent Whitworth machines dating from the 1880s, including a planing machine, and this is all powered by belts and shafts from a double-cylinder horizontal Tangye steam engine of the same date which is in excellent condition.

The heavy lifting crane perched on a small promontory at the end of Prince's Wharf is of interest, being steam powered. Another steam engine operated until 1965 at the entrance to the Bathurst Basin, where it raised a curious bascule lift bridge constructed in the 1870s to carry the GWR from Temple Meads to the southern side of the Float. The bridge had an unusual counter-balance in a deep pit on the Redcliff side of the entrance lock, and as it was built for mixed-gauge working it showed the girders which had once carried the outside rails of the broad gauge track. As the line has been abandoned, the bridge became redundant and was scrapped, but the neat little steam engine which had operated it has been preserved and handsomely restored in the Bristol City Museum.

The Bristol Coalfield

On either side of the Avon at Bristol stretches an extensive coalfield. To the North, coal has been dug in the neighbourhood of Kingswood since the Middle Ages at least, and in more recent times it has been systematically mined out beyond Warmley to the East and beyond Yate to the North. To the South of the Avon, the earliest coal workings were probably in the Mendip foothills of the Nettlebridge valley, but the richest seams have been found more recently in the area between Radstock and Pensford, in which three collieries are still active. The coalfield extended to Bedminster

in the West, and there was also an out-lying basin of coal measures at Nailsea, mined in connection with the glass industry there, and another small basin at Clapton in Gordano.⁵

The industrial monuments of coalfields are not usually very impressive. The shafts themselves are soon covered and forgotten when the mine is abandoned, although they have a disconcerting habit of turning up unexpectedly under new buildings in Kingswood and other areas. Nobody has a complete list of all the shafts which have ever been sunk for coal around Bristol, but the sites of the known shafts sprinkle the large-scale geological map of Kingswood, and there are possibly as many sites again of which all trace has been lost. Apart from the shafts, the characteristic black spoil heaps are the most important clue to the location of coal mines, although they become covered with vegetation if they are abandoned for a generation, and erode quickly even when they are not worked systematically for road filling and other industrial uses. The waste heaps of the mines worked in recent decades in Pensford and Radstock, for example, are rapidly disappearing from sight for both these reasons.

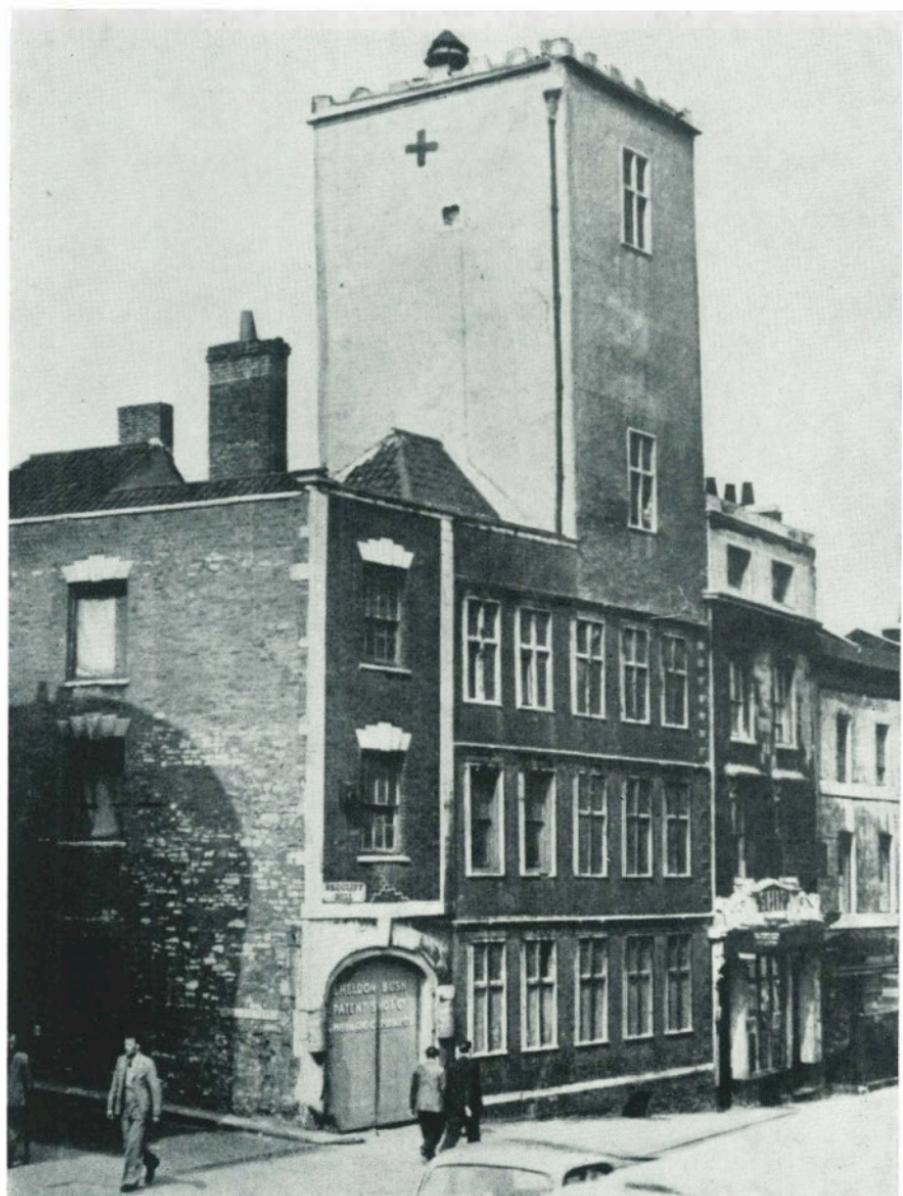
It is not likely that anybody is going to feel sentimental about coal spoil heaps and agitate for their preservation. Still, their location is worth noting because in many cases they provide the sole remaining evidence of coal mining in a locality. In some cases, they may lead to the discovery of more important monuments of the coal industry. These are of two main types: remains of pit-head buildings and equipment, and remains of mineral railways or tramways. There are significant monuments of both types in the Bristol area. Regarding pit-head buildings, there are several cases of the survival of engine houses. One in Cock Road, Warmley, has been incorporated in a smallholding. Another, close to St. George Park, is now a warehouse. These are typical specimens of a form of industrial monument which was at one time very widespread, but which now has to be searched for carefully. Other buildings sometimes survive, such as the strange little cylindrical structure which was probably a powder house at Hanham Colliery.

Most of the equipment of coal mines is broken up or sold at the time the mine closes down, so that the most promising time to search for industrial monuments of this type is when a mine is being run down for closure. The remaining active collieries in the Bristol Coalfield are around Radstock, and they all come in this category. Their future has been in doubt for some years, and it seems likely that they will be closed in the near future as a

result of the rationalization policy which is being pursued by the National Coal Board. Until very recently three steam winding engines were still at work at Old Mills, New Rock, and Writhlington collieries respectively, and there was a fourth engine standing idle at a subsidiary shaft at Kilmersdon. All four engines were of the same basic type, having two horizontal cylinders arranged in parallel with the winding drum in between them, but they had interesting variations of detail. The Old Mills engine is the oldest, being built by W. Evans at the nearby Paulton Foundry in 1861. The disused engine at Kilmersdon, which has now been scrapped, was also an Evans product, although dated 1875. The National Coal Board has recognized the significance of the now-redundant engine at Old Mills by donating it to Bristol City Museum.

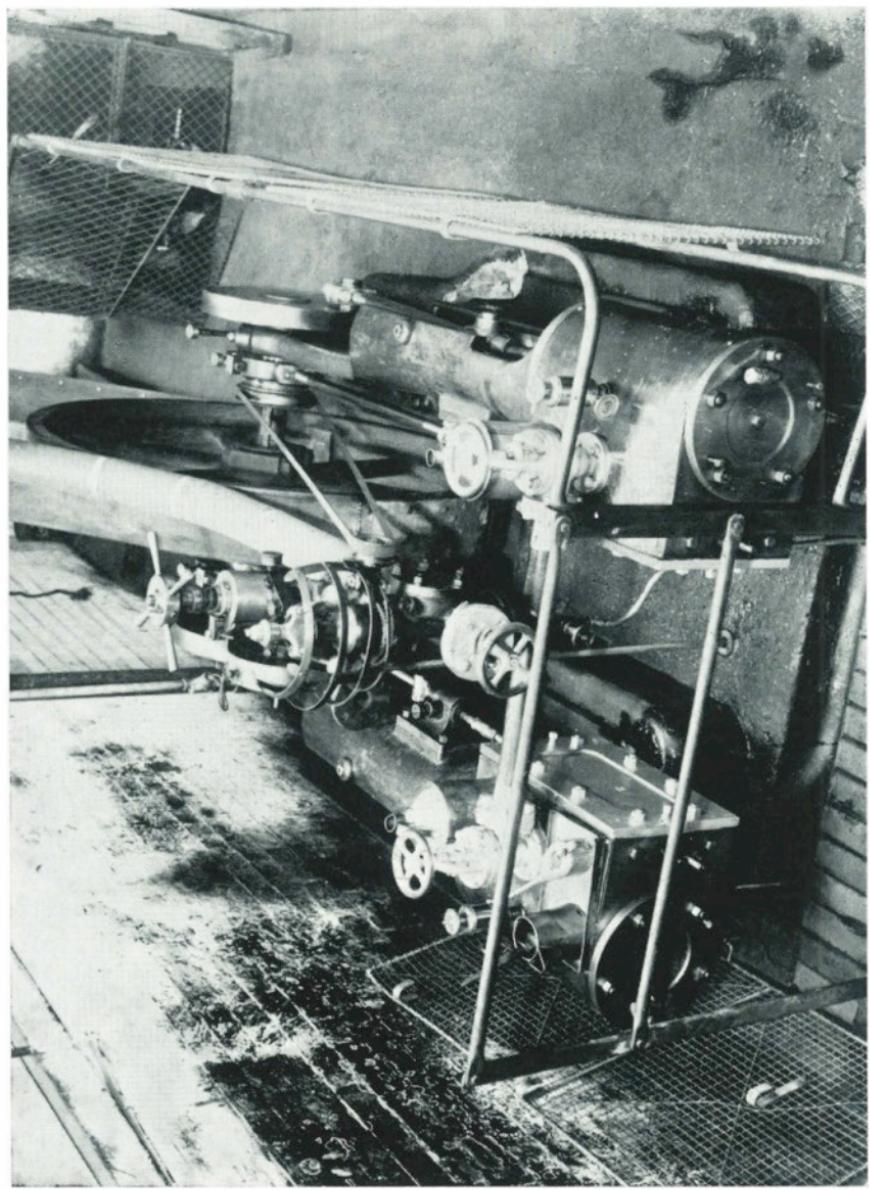
The second main type of industrial monument created by the coal mining industry is the mineral railway or tramway. This was usually a short stretch of rails linking a coal mine with a navigable river or with a main line railway. The most significant monument of this type in the Bristol area is the Avon and Gloucestershire Tramroad. This was opened in 1832, running through Warmley, Oldland, and Willsbridge to a wharf on the Avon opposite Keynsham, a distance of $5\frac{1}{2}$ miles. A junction was made with the Bristol and Gloucester Railway across Siston Common, but in time the GWR acquired the tramway and closed it down. Parts of it were still in operation at the beginning of the present century, although it was soon completely closed and most of the track was sold as scrap in World War I. The track, incidentally, was one of the "fish belly" rail type, laid in cast-iron chairs on stone sleepers. Many of the stone sleepers survive, and parts of the track can be seen occasionally in stretches of fencing.

The gauge was 5' 1", substantially more than the usual tramway gauge, and it is likely that trucks were drawn by animals during most of the period of operation of the line. The tramway was exceptionally well graded for a line of this type, even though it necessitated considerable engineering work to achieve a gentle gradient. At Willsbridge, for instance, there is a deep cutting through hard rock and a tunnel three hundred feet in length. There is a public right of way along considerable lengths of the route, and the alignment of the tramway is apparent even where it has now been built over.



The Shot Tower in Redcliff Hill.

By Courtesy of the Bristol Evening Post.



The Tangye Steam Engine in the Port of Bristol Underfall Yard Workshops.

By Courtesy of the Port of Bristol Authority.

The Metal Industries

Most of the surviving monuments of the Mendip lead industry date from the nineteenth century, when Cornish mining companies brought new techniques for recovering the mineral from the furnace slag abandoned from previous operations which stretched back to Roman times.⁶ Most of the lead mined on the Mendips found its way into Bristol, and much of it was worked in the city. There was a lead refining centre at Netham, and craftsmen in the city turned the ingots into sheeting, piping, and shot. The process for making lead shot invented by Mr. J. H. Watts, a plumber of Redcliff Hill, has left Bristol one of its most remarkable industrial monuments — the Shot Tower opposite St. Mary Redcliff. Watts' process, patented in 1782, consisted of pouring molten lead through a sieve and allowing it to fall into a tank of water. The height of the fall depended upon the size of the shot being poured, the larger the shot the longer the drop necessary to ensure its solidification before it struck the water. Watts constructed a tower on the top of his elegant house, knocking out the floors and ceilings of some of his living rooms in order to give a drop of sixty feet. He then doubled the drop by digging a well directly below the tower to enable himself to make larger shot. This simple but effective process is still being operated in Watts' original premises on Redcliff Hill in 1967.⁷

Iron has been mined and worked in the Bristol area for many centuries, but it has never become a major industry. Mining for iron took place at Long Ashton and at Frampton Cotterell in the nineteenth century: at the latter site, for instance, there are large pits which are now flooded, and the remains of a tramway which linked up with the Iron Acton to Thornbury railway line a mile away.⁸ Of more importance in the economic life of the district, however, was the mining of calamine, one of the sources of zinc. This was used in various enterprises in the Bristol area to make brass. The first large brass works was that at Baptist Mills, of which no sign remains. In the middle of the eighteenth century brass works were established at Warmley and elsewhere. It was William Champion, again, who set up in the brass business at Warmley. He dammed the stream to make a large pool which powered a set of water wheels, and he had furnaces for reducing calamine to zinc (or "spelter" as it was known at the time) and for extracting copper from its ores. The latter process, presumably using ores from Cornwall, was responsible for the copper slag waste which, cast into rectangular or triangular blocks, survives widely in the neighbourhood as a building stone with excel-

lent weathering properties. Brass, which is an alloy of copper and zinc, was manufactured into wire, pins, needles, buttons, and other articles on the spot. The central block of Champion's factory, with its distinctive clock tower and cast-iron window frames, survives as part of an industrial pottery business. The mansion which Champion built for himself has been taken over for Local Government offices. The pool has been drained and turned into a caravan estate, but the remnants of a large statue of Neptune still stand, covered by creeper. A row of industrial cottages, said locally to have been built to accommodate the Dutch workers who had been brought over for their skill in brass processes, is on the point of demolition, and all trace of the water wheels and machinery has disappeared. A substantial tower remains, however, giving its name to Warmley Tower, although its original use is obscure. It is just possible that it was a windmill, but it could also have been a shot tower. Other brass works were set up at Keynsham, Saltford, Kelston, and Twerton. Those at Keynsham were a very large enterprise for their time, having an impressive series of water wheels powered by the Avon. These wheels and many of the buildings were demolished some years ago, but the plan of the site can still be discerned from Keynsham Bridge. There are very few surface remains at the other sites.⁹

Textiles

Wool has been the traditional textile manufacture of the Bristol area and although evidence of its existence in the city only survives in a few street names such as Tucker Street ("tucking" was another name for fulling the woven cloth), the industry still exists today in the Stroud valleys and Wiltshire, where there are extensive remains of the industry from its flourishing days. These areas, however, fall outside our scope, and by a strange anomaly the major relic of the textile industries in the Bristol region is associated with cotton, a textile not usually connected with the South West.

The Great Western Cotton Factory was built in Barton Hill, then on the outskirts of Bristol, in 1838. It was hoped to take advantage of the revival in the fortunes of Bristol's trade promised by the inauguration of trans-Atlantic steamship trade by Brunel's *Great Western* in that year, and although the promise was not fulfilled the site chosen for the factory on the side of the Feeder Canal proved to be very convenient, both for bringing in the supply of raw cotton and for re-fuelling the boilers of the factory steam engines. The factory was planned as an integrated unit, perform-

ing all the operations in the manufacture of cotton fabrics on the single site. The two most important processes, spinning and weaving, were housed in the largest buildings, the six-storey spinning block and the single-storey weaving shed respectively. It is these which survive today as one of the most massive industrial monuments of the Bristol area.

When the factory was enjoying its greatest prosperity, in the second half of the nineteenth century, it employed well over a thousand workers (of both sexes) and became the centre of a busy industrial community. Churches, shops, and public houses were built to cater for the community, and even though the face of Barton Hill has been transformed by wartime bombing and re-development, the earlier pattern of life orientated around the cotton mill can still be discerned. The cotton enterprise declined in the twentieth century and went into liquidation in 1925. For several years thereafter the premises were owned by the Western Viscose Silk Company, operating one of the early artificial textile processes which has itself become a part of industrial history. With the collapse of this venture in 1929 the buildings stood empty for some time, until the weaving shed was sub-let in small units for industrial uses and the spinning block was taken over as a warehouse by a road haulage firm.

It is the six-storey spinning block which is the most interesting part of this industrial monument. It is substantially constructed of brick and stone with a cast-iron frame in the best tradition of fire-proof mills as it developed in the early phases of the Industrial Revolution. The floors are of stone slabs on brick vaults across the rows of cast-iron pillars. Only in the ceiling of the top floor was wood used. The spinning machines were originally powered by shafts and belts from steam engines incorporated in the main block: the engine room can be easily recognized from outside because its windows are those taking up two floors in the building. In the 1880s a new engine house was constructed in an annexe which looks rather like an ecclesiastical structure on the western end of the mill. Apart from these major features, the mill has many interesting details, including a clock mechanism in the staircase tower, washing and toilet facilities of a rudimentary type, and variations in the size and shape of cast-iron columns. The entrance gate and main approach still retains, in its view of the mill, something of the austere dignity which it must have had when it was a flourishing enterprise sustaining a large local population.¹⁰

Soap, Glass, and Pottery

Soap-making is one of the oldest of Bristol's manufacturing industries, and although the industry has now virtually disappeared from the city, it has left a large industrial monument in the shape of the factory in Broad Plain built by Christopher Thomas in the nineteenth century style of Bristol Gothic architecture. With its red brick structure and corner towers (now somewhat truncated) it stands well above the surrounding buildings and provides a good landmark from the eastern approaches to Temple Meads Station. The building is now used as a warehouse and display centre by a Bristol firm, and the interior has been completely remodelled so that no trace of its original use remains.

Specimens of Bristol glass are world-famous collectors' pieces, and the glass-making industry was at one time a large and flourishing local enterprise. The main centres were in Redcliff and, to the South-West of the city, at Nailsea. Many Nineteenth century photographs and prints of the city skyline show the cones of the glass factories, although as these are indistinguishable from pottery kilns from any distance it is not always easy to place them precisely as both processes were established in the Redcliff area. Glass-making, however, died out completely in Bristol in the nineteenth century, being unable to compete with large-scale production of larger enterprises in the North of England. One monument to the industry remains in Bristol: a truncated glass cone until recently used by a firm manufacturing artificial fertilizers in a Redcliff factory. The top was removed from the cone before World War II because of the deterioration of the brickwork, and a roof of corrugated sheeting put over it.

Pottery has been manufactured in Bristol since the middle of the seventeenth century, when new Dutch techniques were giving a boost to the process in various parts of the country. Earthenware with the opaque white glaze known as "Delftware" was made at Brislington Pottery, now lost under the Board Mill at St. Anne's. The present firm of Pountneys' Bristol Pottery can claim a descent from this establishment, through a site occupied for two centuries in Temple Back but now obliterated, to its present home in Fishponds. The pottery on Lodge Causeway was built as a model factory in 1906, with a battery of bee-hive kilns down the centre. Of these two kilns remain as a notable industrial monument, although disused since the factory was converted to continuous-firing. The many other potteries in Bristol, mainly in the Temple Back area, have disappeared without trace.

Until recently, the remains of a small pottery could be seen on the banks of the Avon in Crews Hole.¹¹

Crews Hole is the stretch of the Avon valley between Netham weir and Conham. Although only a couple of miles from the city centre, the northern side of this valley has been largely by-passed by twentieth century development, so that the district has become one of those areas of decaying industrialization which are the happiest hunting grounds of industrial archaeologists. On the northern slopes at the Netham end of the valley are the surviving buildings of a large chemical factory, now a scrap-yard, and the remnants of wharves on the river bank. Here, also, was the Netham lead refinery, with a jetty running out into the river, but this has disappeared almost without trace. Half-way up the valley, near the site of the pottery already mentioned, is a chimney incorporating some of the copper slag blocks found all over the area. The chimney was probably part of the surface workings of one of the collieries in the valley, but the more spectacular chimney on Troopers' Hill was once a flue for the tar and chemical factory which still flourishes at the eastern end of the valley.

Food, Drink and Miscellaneous Industries

Industries specializing in food and drink processes have always played an important role in the history of Bristol, and this was emphasized by the development of colonial trade in the eighteenth century which brought a supply of plantation products into Bristol. Sugar and cocoa processing thus became important Bristol industries, serving a wide market. The boiling and crystallization of sugar was practised normally as a small-scale process in various parts of the city, so that virtually nothing remains to be seen of it. In the nineteenth century, however, Conrad Finzel introduced new techniques into the industry and set up a large factory on the Counterslip. The innovations came too late to save the Bristol sugar industry from competition with large-scale producers elsewhere, and the industry declined and disappeared by the beginning of the present century. The remains of Finzel's factory, including the shell of the engine house, were incorporated in what is now Courage's Brewery.

Cocoa processing was more fortunate. The interest of Quaker industrialists in the cocoa industry ensured a supply of capital and large-scale organisation which resulted in the construction of Fry's extensive premises in Pithay which were only recently demolished as part of the re-development of this central area. The firm had moved out to Somerdale, however, in 1923, and on this

spacious site designed a model factory. Bristol, like all substantial towns, has always attended to the thirst of its citizens by brewing beer and other beverages. Only one large brewery survives in the city now, and this is of limited interest from an industrial archaeological point of view. The most famous of Bristol drinks, however, are the wines and sherries imported and blended in the city. The firm of Harveys has recently equipped part of its ancient cellars as a museum of wines.

Another aspect of food industries is the provision for storing bulk commodities in a port, which has resulted in the construction of many fine warehouses in the city. Worthy of particular note is the distinctive building of Pearces' Warehouse on Welsh Back, designed as a granary in what is probably the most exuberant example of "Bristol Byzantine" architecture. The other outstanding warehouses of the city are the bonded tobacco stores around the Cumberland Basin, with a much more austere and functional appearance.

There were certainly several dozen water mills in the Bristol area, and most of them were concerned primarily with corn grinding. The mill sites of the Frome valley, for instance, show how the fast-moving streams of the neighbourhood have been harnessed for this purpose. Between Eastville Park and Frenchay there are no less than eight sites, and there are as many more above Frenchay. The best known and best preserved is that in Snuff-Mills Park, complete with a reconstructed breast wheel and the fly-wheel of a steam engine which at one time acted as an auxillary source of power. Despite its popular name, it is uncertain whether snuff was ever ground here. The site of the original "Snuffy Jack's" mill is about half a mile upstream just below the foot-bridge, and consists of a few irregularities in the ground.¹² The conversion of a few corn mills to snuff grinding occurred in the eighteenth century, when snuff-taking was in vogue.

As for windmills, the story is more simply told, because Bristol did not come in the major windmill area of the country — viz. the East and South-East. Several specimens of the compact Somerset type of tower mills survive, one of which, at Chapel Allerton just to the south of the Mendips, has been handsomely restored in recent years and was presented to Bristol City Museum by Mr. C. Clarke in 1966. The others are mostly without their sails, and are frequently in an advanced condition of dilapidation. The only windmill towers in the environs of Bristol are the Observatory tower on Clifton Down, the tower in the centre of Frampton Cotterell village, and the tower incorporated in a golf club house at Portishead.

Snuff grinding was, of course, the result of the considerable trade in tobacco which came into the city along with the other plantation commodities, and tobacco processing has become a major industry in Bristol. The world-famous firm of W. D. & H. O. Wills with its headquarters in Bedminster has set up its own museum of pipes and smoking, and has presented a cigarette-making machine to the City Museum. Another plantation product, rubber, became available in bulk during the nineteenth century, and rubber processing began in Bristol and neighbouring towns. A rubber manufacturing firm occupied the very solid factory which still stands at 104, Stokes Croft. Although now converted to other uses, the building shows a serious attempt to maximise window space within the limits of traditional stone construction.

Dyestuffs have been important in the history of Bristol and its neighbourhood since the early days of the woollen industry. On the River Chew just to the south of Keynsham stands the Albert Mill, a very fine specimen of a water mill, which went over to grinding imported logwood for yellow and orange dyes in the nineteenth century. Of the two large breast wheels, the one on the outside of the mill is still operational and was until recently still driving the log-cutting machinery. The machinery in the mill includes two large edge grinding wheels.¹³

Municipal Services

In the Middle Ages, the quality of the water piped into Bristol in conduits of elm piping was the envy of visitors from less fortunate towns. One of the ancient watering places survives at St. John's Gate. By the middle of the nineteenth century, however, this old system had become totally inadequate, and the insanitary condition of the town and its water supply was the subject of serious concern. A company was promoted in 1846 by a number of public-spirited men including Dr. William Budd, an authority on epidemics, to provide a better water supply. From this sprang the Bristol Waterworks Company, and the system of reservoirs and pipes constructed throughout the area in the last hundred years. Major pumping stations were constructed at key points, and equipped with steam engines, of which those at Blagdon reservoir and Oakfield Road, Clifton still survive, although not in use. A collection of small relics of the Bristol waterworks was made by the late Mr. F. C. Jones, and is now housed in an unsorted condition in a building at the Barrow Water Treatment Centre.¹⁴

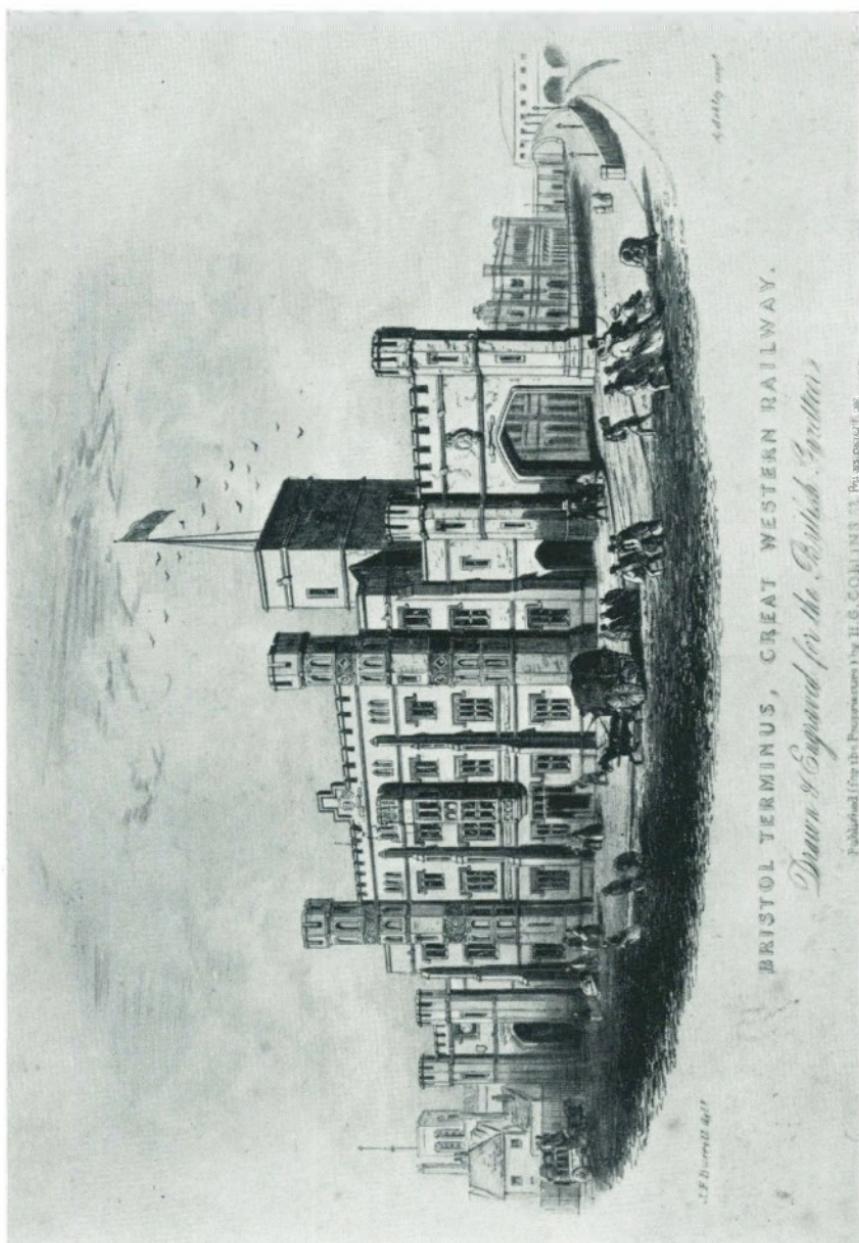
The city acquired several gas-producing factories in the nineteenth century, although as a result of the rationalization of the

industry carried out by the South Western Gas Board not all these are still operational. Some of the buildings and sites such as those at Canon's Marsh remain as somewhat untidy and, in some cases, almost derelict, industrial monuments. Electricity was produced by a municipal undertaking in Bristol before nationalization, but the earlier installations have all been superseded by the larger power station at Portishead and by supplies from the grid now being boosted by the atomic power station at Berkeley, with the other Severn-side atomic stations due to join in shortly. Two electricity generating buildings survive in the city: the old municipal power station on Temple Back and the elegant brick and stone edifice by St. Phillip's Bridge, now incorporated in Courage's Brewery, which at one time housed the power supply for the Bristol Tramways.

The Tramway system was scrapped in 1940, and hardly any trace remains of the important means of transport once maintained by those noisy and colourful machines expressively styled "the gondolas of the people" by Richard Hoggart. Not a single tram was preserved, although the City Museum has managed partially to re-assemble one. A few scraps of track are still to be seen, including a short stretch alongside the main approach to Temple Meads Station. In Horfield, a tram depot has been converted into a garage, and parts of other depots survive at Arnos Vale and Perry Road. There is a curious relic in the Churchyard of St. Mary Redcliff, where a stretch of line has been left impaled in the ground, thrown there in the Bristol Blitz of 1940. Many old Bristolians still refer to the City Centre as "The Tramways Centre", because it was here, when the upper part of the Frome Harbour was covered in, that the trams made their central station.

Transport

Discussion of the Bristol Tramways leads to a consideration of the broader aspects of transport in the Bristol Region. The region was one of the first in the country to benefit from the improvements in road-building technique introduced by J. L. MacAdam, a fact which is commemorated by a plaque outside the house in Berkeley Square where MacAdam lived for several years after being appointed Surveyor-General of the Bristol roads in 1815. The alignments of some of his roads are still followed by the modern road pattern, and the sites of toll houses dating from this period can occasionally be found, although very few toll houses now remain in the region, at least two having been



BRISTOL TERMINUS, GREAT WESTERN RAILWAY.

Drawn & Engraved for the Great Western

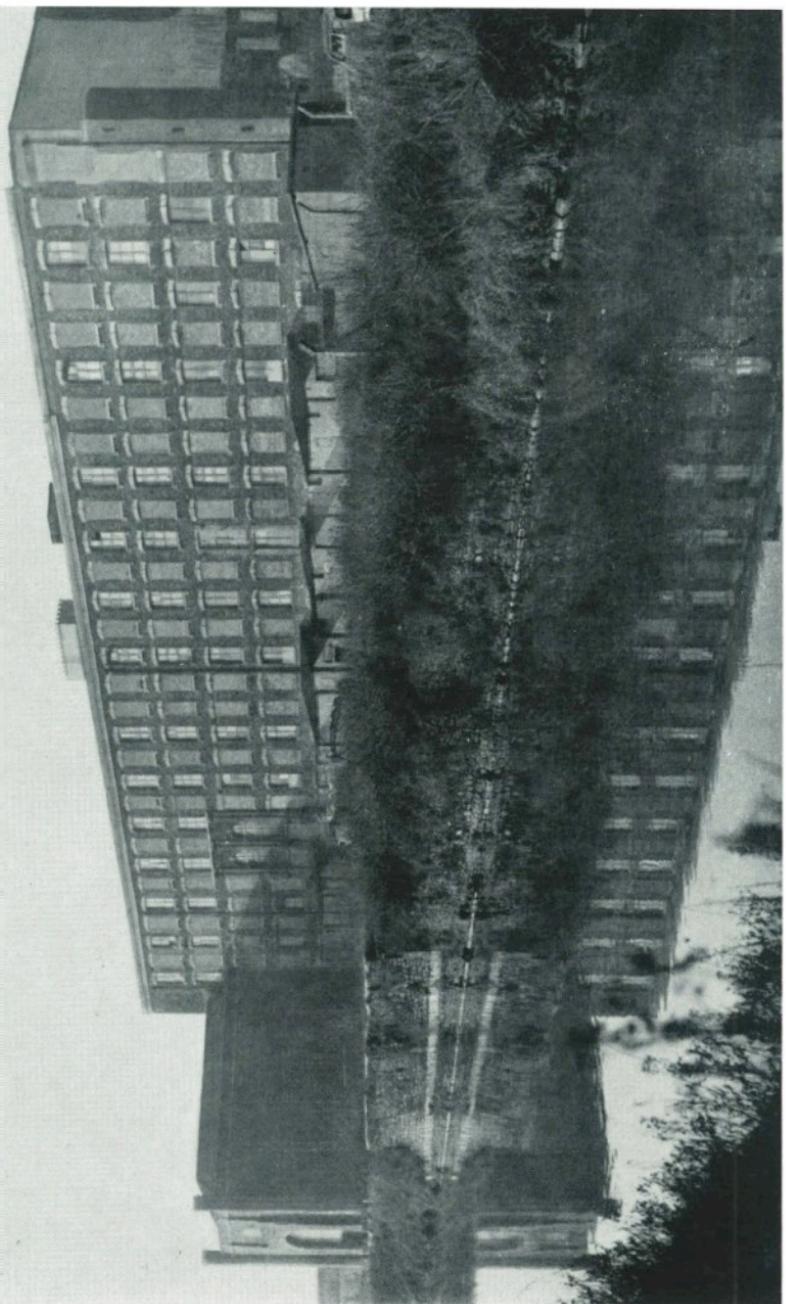
Published from the Originals by J. B. C. & Sons. This was engraved for

The Temple Gate frontage of Temple Meads Station.

By Courtesy of the City Museum and Art Gallery, Bristol.

The Great Western Cotton Factory in Barton Hill.

By Courtesy of the Bristol Buildings Record.



demolished since 1965 — one at Bedminster Down and the other on the A4 between Bath and Saltford.

An interesting detail of the industrial archaeology of roads is what may be called "street furniture". A surprising amount of this survives in the form of bollards, man-hole covers with inscriptions which are still legible, railings of various sorts, shop-signs, street clocks, weather vanes, and conveniences. An interesting example of the latter in cast-iron construction survives on Horfield Common, and there are others in the city. Shop fronts themselves can often impart useful historical information for dating modifications or showing changes in fashions. To name only one Bristol street with a wealth of such detail, and a street which amply lives up to its name, Victoria Street is well worth a close examination before it is completely transformed by the pressing forces of modernization.

From Victoria Street it is a short step to Temple Meads Station, and thus to one of the greatest industrial monuments of the city. The original station — conveniently referred to as "Old Temple Meads" — was built by I. K. Brunel as the western terminus to the Great Western Railway which he had engineered from Paddington on his famous "broad gauge". When the line was pushed on to Exeter and Cornwall, passengers had to change trains onto the station of the Bristol and Exeter Railway built at right-angles to it, and when the two were eventually linked by the present curved station the Bristol and Exeter station was demolished (except for the distinguished office block which remains) in order to make way for the main station approach ramp. This left the Old Temple Meads Station in a backwater in which it has remained ever since, performing only light if any duties. The Station is in two parts. Fronting onto Temple Gate is the elegant stone-built block which provided the original main entrance and offices. Behind this was the train shed, with its spacious well-lit platforms covered by a remarkable wooden roof in a mock-hammer beam style. The train shed is now threatened by the modernization plans of British Railways while the Temple Gate frontage is under another threat — that of the City Planning Department's road widening schemes. It is much to be hoped that some way will be found to preserve this fine industrial monument.¹⁵

There are, of course, many other railway monuments in the Bristol Region, even though none of them match up to Old Temple Meads in importance. The decorative tunnel entrances with which Brunel embellished his line into Bristol survive. The steam pump-

ing engines at the Bristol end of the Severn Tunnel, however, have been demolished. The Somerset and Dorset line, with its pleasant station at Bath Green Park and steep gradients over the Mendips, was closed down at the beginning of 1966. Many stretches of line have disappeared in the last few decades, although the alignments of some such as the Weston, Clevedon and Portishead Railway can still be traced out, and the tunnel of the Clifton Rocks Railway connecting Clifton with the Portway survives.

Locomotive construction in Bristol is as old as the railway system, and many well-known engineering firms have been associated with it. The Avonside Engine Company, for instance, was founded by Henry Stothert in 1837 and supplied some of the original locomotives for the GWR. The firm moved from its first site in St. Philips to Filton in 1905. The Filton factory was sold in 1936, but the buildings still survive.¹⁶ Another form of railway monument which is worth mentioning is that of hotels designed to accommodate passengers from the railways. Brunel House, the colonnade-fronted building behind the Council House in Bristol, was built by Brunel for this purpose. Later in the nineteenth century, the New Passage Hotel was built at Severn Beach for the benefit of traffic on the shortest route to Wales before the opening of the Severn Tunnel in 1886. The masonry stump of the pier which carried the trains to the waiting ferry boats can still be seen behind the Hotel.

The fate which is now overtaking the railway system of the country long since pronounced the doom of the canals. With its port and long stretch of the navigable Avon, canals did not feature as important additions to the transport system in the immediate environs of Bristol, but from Bath to the East the Kennet and Avon Canal was cut by John Rennie at the beginning of the nineteenth century through beautiful countryside with which the graceful architecture of the Bath stone bridges and aqueducts blended charmingly, as it does to this day. An enthusiastic body of amateurs, the Kennet and Avon Canal Trust, is making itself responsible, with the co-operation of the British Waterways Board, for the re-opening of the stretch from Bath to Bradford for navigation.

Of the lesser canals of the area around Bristol, the most important was undoubtedly the Somerset Coal Canal, which linked up the collieries in the valley of the Cam Brook with Midford and the Kennet and Avon Canal at the Dundas Aqueduct. Much of the course of this canal can still be traced, including the remark-

able flight of twenty-two locks at Combe Hay, taking the canal up a hairpin bend to a higher level. Another canal on a similar East-West alignment was projected some miles to the south, along the Nettlebridge valley, and although it was never completed there are some prominent monuments remaining such as the substantial aqueduct at Coleford and the sites of the unusual lift locks on Barrow Hill.¹⁷

The other mode of transport which has become associated with Bristol in the twentieth century has not yet provided many industrial monuments. When Sir George White, the Chairman of the Bristol Tramways Company, decided to go into aircraft production in 1910, he was probably thinking, in part at least, of boosting traffic to the Filton terminus of the Tramway. Whatever his intention, he was certainly responsible for a great development of this part of the Bristol urban area, centred upon the airfield and the factories around it. It is an encouraging sign of the awareness of the importance of tradition in this industry that it has recently donated a replica of the original Bristol Boxkite to the City Museum. In time, other monuments of this important industry should be considered for preservation.

It is appropriate to complete this review of Bristol's industrial archaeology by drawing attention to one of Brunel's most famous and most decorative contributions to the landscape of the city — the Clifton Suspension Bridge. Over thirty years elapsed between the time when Brunel won the competition for the design and the time when, in 1864, the Bridge was completed as a worthy monument to the work of this great creative engineer. A century after its opening, it still carries daily a great flow of commuter traffic and provides a focus for the enjoyment of many visitors to the city. This is an industrial monument which is universally appreciated, and the fact that it is so could be taken as an indication of the pleasure and instruction which is to be gained from an understanding of the industrial archaeology of a great city such as Bristol.

NOTES:

1. For a general account of the study of industrial archaeology see Kenneth Hudson: *Industrial Archaeology*, John Baker, 1963; and for a more detailed survey which includes the Bristol region, see the same author's: *The Industrial Archaeology of Southern England*, David & Charles and MacDonald, 1965. See also J. P. M. Pannell: *Techniques of Industrial Archaeology*, David & Charles, 1966. For a summary of the main Bristol sites, see the Bristol Archaeological Research Group Field Guide No. 4 by N. Cossons: *Industrial Monuments in the Mendip, South Cotswold and Bristol Region*, 1967.
2. For accounts of the Port of Bristol, see two of the pamphlets in the present series—J. W. Sherbourne: *The Port of Bristol in the Middle Ages*, 1965, and Walter Minchinton: *The Port of Bristol in the Eighteenth Century*, 1962. See also the detailed account of the various improvement plans by Alan F. Williams: "Bristol Port Plans and Improvement Schemes", in *Trans. of B. & G. Arch Soc.*, Vol. 81, 1962.
3. For the story of this vessel and in particular a graphic account of the extraordinary efforts to get her out of the Floating Harbour in 1844, see the pamphlet in the present series—Grahame Farr: *The Steamship Great Britain*, 1965.
4. The "Albion Dockyard" was started by the Company in 1820. See J. C. G. Hill: *Shipshape and Bristol Fashion*, Liverpool 1951.
5. For the ancient history of the coalfield see H. T. Ellacombe: *The History of the Parish of Bitton*, Exeter 1887, and A. Braine: *The History of Kingswood Forest*, London, 1891. For an account of the coalfield North of the Avon see Dorothy Vinter: "The Archaeology of the Bristol Coalfield", in *Journal of Industrial Archaeology*, vol. 1, No. 1, May, 1964.
6. J. W. Gough: *Mines of Mendip*, Oxford, 1930, contains an excellent description of the history of lead mining in the district, and an account of the industrial relics. See also the relevant sections in Coys, Mason, and Waite: *The Mendips*, Hale, 1954.
7. There is no complete account of the Shot Tower in print at the moment, but it has been the subject of occasional articles in the local press over the years. See, for instance: "The Romance of a Bristol Landmark" in *Western Daily Press*, 11th August, 1950; "Histories of Bristol Companies—Sheldon Bush & Patent Shot Co." in *Illustrated Bristol News*, August, 1960; and "He had a dream and his Shot Tower brought a £10,000 fortune" in *Bristol Evening Post*, 10th August, 1965.
8. There are relics of many small iron manufacturing enterprises in the area, one of the most important being that of the Fussell family, edge-tool makers famous for the quality of their agricultural implements. The history of this family enterprise, which has left many industrial monuments around Mells has been well chronicled recently by Robin Athill: *Old Mendip*, David & Charles and MacDonald, 1964—see particularly Chapter 6.
9. H. Hamilton: *The English Brass and Copper Industries to 1800*, London, 1926, has many local references. Note especially the photograph of the Harford and Bristol Brass Co. at Keynsham, taken in 1925 (facing page 149). Another mineral which has been extensively worked in the Bristol area is celestine, the ore of strontium. There are large open-cast workings at Yate, and remains of quarries, a tramway, and even a small dock, in the vicinity of Leigh Woods.

10. J. Latimer: *The Annals of Bristol in the Nineteenth Century*, Bristol, 1887, contains an account of the establishment of the Cotton Factory (p. 237). A useful summary of its early history is in *Work in Bristol*: a series of sketches reprinted from the *Bristol Times and Mirror*, in 1883. Wm. T. Sanigar: *Leaves from a Barton Hill Notebook*, Bristol, 1954, gives a good picture of the influence of the factory on its neighbourhood. Sanigar was a distinguished local historian, and his papers deposited in Bristol City Archives contain valuable material on the Great Western Cotton Factory.
11. See W. J. Pountney: *Old Bristol Potteries*, Bristol, 1920; and also K. Marochan: "Crews Hole Pottery, St. George, Bristol", in *Trans. B. & G. Arch. Soc.*, vol. 83, 1962.
12. There is an account of the Frome valley water mills in the manuscript notes by the Rev. L. H. Dahl: *Stapleton*, available in the Bristol City Reference Library.
13. See the article on the Albert Mill, "The Last of the Dyewood Mills", by Mrs. Joan Day: *Industrial Archaeology*, vol. 3 no. 2, May, 1966.
14. F. C. Jones was a prominent local historian. He was an employee of the Bristol Waterworks Company, and wrote the official booklet to commemorate the centenary of the undertaking: *Bristol's Water Supply and its story*, Bristol, 1946.
15. Nikolaus Pevsner: *The Buildings of England—North Somerset and Bristol*, 1958, p.421, has an interesting note on the Station, although he is wrong in describing the roof as "hammerbeam", despite its appearance: see John W. Totterdill: "... a peculiar form of construction" in *Bristol & Somerset Society of Architects Journal*, 1955. Old Temple Meads was built in 1839-40. The main part of the modern building was constructed in 1865-78. The train shed has recently been converted into a car park, without affecting the main structure.
16. There is an account of the Avonside Engine Company in L. T. C. Rolt: *A Hunslet Hundred*, David & Charles, 1964, Chapter 6.
17. The best account of this projected canal is that in Robin Atthill, *op. cit.*, Chapter 14.

Author's Note

The Survey of Industrial Monuments of the Bristol Region was launched in 1964 in order to make a comprehensive record of the industrial remains of Bristol and its surrounding districts. It is very much a team effort, so that in much of this essay I have relied heavily on the help of many enthusiastic field workers who have volunteered to spend their time and energy on the task. I am deeply grateful for the help of these friends and, in particular, I would like to mention the invaluable assistance of my good friend and colleague Mr. Neil Cossons, Curator in Technology at the Bristol City Museum. While asserting that the Survey is a "combined operation", however, I must emphasize that I alone am responsible for this account of it in its present stage. The Survey is by no means complete, at the beginning of 1967, but we hope in time that it will be possible to publish a full-length report of the work.

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